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BOOK ANNOUNCEMENTS

Martin Aigner, Combinatorial Search (Wiley, New York, 1988) 368 pages

Chapter 1: *Basic Results.* The model. Search processes and trees. Search processes and codes. Search processes: Worst case. Search processes: Average case. Alphabetic search processes. Binary search trees. Predetermined algorithms. Binary search processes. A game-theoretic point of view. *Chapter* 2: *Weighing Problems.* Balance scale. More coins are defective. Weighings with a spring scale. Spring scale: Arbitrary case. *Chapter* 3: *Graph Problems.* Graph notions. Searching for an edge: Binary variant. Searching for an edge: Ternary variant. Searching for an edge. Searching for subgraphs. Recognizing subgraphs. *Chapter* 4: *Sorting Problems.* Linear sorting. Merging chains. Selection problems. Sorting networks. Parallel sorting. *Chapter* 5: *Poset Problems.* The general sorting problem. Producing posets. Data location. Correlation among linear extensions. *Chapter* 6: *Some More Problems.* Notions from convex geometry. Polyhedral membership problem. Colorings of graphs. Longest increasing subsequences.

Johan Torkel Hastad, Computational Limitations for Small Depth Circuits (MIT Press, Cambridge, MA, 1987) 82 pages

Chapter 1: *Introduction.* The circuit model of computation. Lower bounds for small-depth circuits, a history. Our improved lower bounds. Small depth circuits and relativized complexity. Is majority harder than parity? Related results. Outline of thesis. *Chapter* 2: *Small Depth Circuits.* General notation. Computational model. Smallest size circuits for parity. Some related complexity classes. How hard is it to invert NC^0 permutations? *Chapter* 3: *Outline of Lower Bound Proofs.* Intuition behind the lower bound proof. Restrictions. *Chapter* 4: *Switching Lemma.* Proof and statement of Switching Lemma. Improving the constant. Estimates on the size of α. *Chapter* 5: *Lower Bounds for Small Depth Circuits.* Lower bounds for parity. Lower bounds for majority. Improving the constant. *Chapter* 6: *Depth-k is More Powerful Than Depth k − 1.* The Sipser functions f_k^m. New random restrictions. Back to the proof of Theorem 6.1. *Chapter* 7: *Applications to Relativized Complexity.* Preliminary lemmas. An oracle such that $PSPACE^A \neq PH^A$. An oracle such that $\sum_i^{p,A} \neq \sum_{i-1}^{p,A}$ for all i. Separation by random oracles. *Chapter* 8: *How Well Can Small Small-Depth Circuits Compute Parity? Chapter* 9: *Is Majority Harder Than Parity?*

Melvyn W. Jeter, Mathematical Programming: An Introduction to Optimization (Dekker, New York, 1986) 336 pages

Chapter 1: *An introduction to Mathematical Programming.* The mathematical programming problem. Examples of mathematical programming problems. Global and local solutions. Post-optimal analysis, parametric programming, and stability. Some historical comments. *Chapter* 2: *Subspaces, Matrices, Affine Sets, Cones, Convex Sets, and the Linear Programming Problem.* A review of elementary linear algebra. Affine and convex sets. The linear programming problem. *Chapter* 3: *The Primal Simplex Pro-*

cedure. The primal simplex procedure. Artificial variables and artificial cost coefficients. Artificial variables and the two-phase method. *Chapter* 4: *Duality and the Linear Complementarity Problem.* Dual linear programming problems. Interpretation of the dual problem (post-optimal analysis). Post-optimal analysis. The dual simplex procedure. Complementary slackness. The linear complementarity problem. Lemke's complementary pivoting algorithm. *Chapter* 5: *Other Simplex Procedures.* The primal simplex tableau revisited. The revised simplex procedure. The product form of the inverse. The elimination form of the inverse. The primal-dual algorithm. Parametric linear programming. Degeneracy and cycling. Decomposition. Reinversion. *Chapter* 6: *Network Programming.* Linear network flow problems. Some basic graph theory. The network simplex procedure for the transshipment problem. The maximal flow problem. Primal dual procedures for network flow. *Chapter* 7: *Convex and Concave Functions.* Introduction. Convex functions of one real variable. Some topics from Calculus. Convex functions of several variables. Optimization of convex functions. Quasiconvex functions and other generalizations. *Chapter* 8: *Optimality Conditions.* Unconstrained problems. Nonnegative variables. Equality constraints. Nonnegative variables and equality constraints. Nonnegative variables and inequality constraints. The Kuhn-Tucker theorem. References. *Chapter* 9: *Search Techniques for Unconstrained Optimization Problems.* One-dimensional linear search techniques. Linear search techniques by curve fitting. Linear search techniques for differential functions by curve fitting. Multidimensional search techniques. References. *Chapter* 10: *Penalty Function Methods.* Introduction. Barrier function methods. The quadratic penalty function method.

Geoffrey J. McLachlan and Kaye E. Basford, Mixture Models (Dekker, New York, 1988) 253 pages

Chapter 1: *General Introduction.* Introduction. History of mixture models. Background to the general classification problem. Mixture likelihood approach to clustering. Identifiability. Likelihood estimation for mixture models via EM algorithm. Starting values for EM algorithm. Properties of likelihood estimators for mixture models. Information matrix for mixture models, Tests for the number of components in a mixture. Partial classification of the data. Classification likelihood approach to clustering. *Chapter* 2: *Mixture Models with Normal Components.* Likelihood estimation for a mixture of normal distributions. Normal homoscedastic components. Asymptotic relative efficiency of the mixture likelihood approach. Expected and observed information matrices. Assessment of normality for component distributions: Partially classified data. Assessment of typicality: Partially classified data. Assessment of normality and typicality: Unclassified data. Robust estimation for mixture models. *Chapter* 3: *Applications of Mixture Models to Two-Way Data Sets.* Introduction. Clustering of hemophilia data. Outliers in Darwin's data. Clustering of rare events. Latent classes of teaching styles. *Chapter* 4: *Estimation of Mixing Proportions.* Introduction. Likelihood estimation. Discriminant analysis estimator. Asymptotic relative efficiency of discriminant analysis estimator. Moment estimators. Minimum distance estimators. Case study. Homogeneity of mixing proportions. *Chapter* 5: *Assessing the Performance of the Mixture Likelihood Approach to Clustering.* Introduction. Estimators of the allocation rates. Bias correction of the estimated allocation rates. Estimated allocation rates for hemophilia data. Estimated allocation rates for simulated data. Other methods of bias correction. Bias correction for estimated posterior probabilities. *Chapter* 6: *Partitioning of Treatment Means in ANOVA.* Introduction. Clustering of treatment means by the mixture likelihood approach. Fitting of a normal mixture model to a RCBD with random block effects. Some other methods of partitioning treatment means. Example 1. Example 2. Example 3. Example 4. *Chapter* 7: *Mixture Likelihood Approach to the Clustering of Three-Way Data.* Introduction. Fitting a normal mixture model to three-way data. Clustering of soybean data. Multidimensional scaling approach to the analysis of soybean data.